

Ariz., on Salt River, and at the crossing of the Maricopa, Phoenix, and Salt River Valley Railroad over the Gila River; and special rainfall stations at Benson, Flagstaff, Jerome, San Carlos, and Seligman, Ariz.

Service has also been inaugurated along the Colorado River, under the supervision of the local office of the Weather Bureau at Denver, Colo., and special river stations have been located at Fruita, Colo., on the Grand River, at Elgin, Utah, on the Green River, and at Grand Canyon and Topock, Ariz., on the Colorado River.

SPECIAL ARTICLES, NOTES, AND EXTRACTS.

DR. ALEXANDER BUCHAN.

When Gen. Albert J. Myer was ordered by the Secretary of War to carry out the provisions express in the act of Congress of February 9, 1870, establishing what we now know as the United States Weather Bureau, it was necessary for him to begin by educating a corps of practical meteorologists. To do this he organized a school of instruction at Fort Whipple, Va. (now Fort Myer), adjoining Arlington, near Washington, D. C. The only two text-books available at that time were Loomis's *Treatise on Meteorology* and Buchan's *Handy Book of Meteorology*, the second edition of which had just been published. Professor Loomis himself past away in 1889, and now we are called upon to record the death, on the 13th of May, 1907, of Dr. Alexander Buchan, at the age of 78. This removes from the world of science a man of world-wide reputation—an indefatigable worker in meteorology, and one whose influence has been widely felt. We are indebted to his colleague, B. T. Omond, esq., honorary secretary of the Scottish Meteorological Society, for a beautiful tribute to the memory of Doctor Buchan which has furnished material for the following lines.

Doctor Buchan was born in 1829, at Kinnesswood, in Kinross-shire, not far from Edinburgh; and in due time he found his way to that center. He graduated at the university and devoted himself to teaching until 1860, when an affection of the throat compelled him to lay aside the profession of his choice; but he always retained his interest in it, as well as in field botany. In 1860 he was appointed secretary to the Scottish Meteorological Society, in whose journal he published many of the results of his labors, until the time of his death. In 1869, in Volume XXV of the *Transactions of the Royal Society of Edinburgh*, there appeared one of the most famous papers of the day, entitled "The mean pressure of the atmosphere and the prevailing winds over the globe". Doctor Buchan had accomplished the Herculean task of coordinating the available data for the whole world. He had brought order out of chaos. He had accomplished a feat that had been declared by many to be impossible, of which Supan has said: "If Buchan had been more cautious we might still to-day be without the isobars of the globe". It is worth recording that an equally great work was being carried on at almost exactly the same time by the eminent Prof. James Henry Coffin, under the auspices of the Smithsonian Institution, "On the Winds of the Northern Hemisphere", embracing all the available records up to the end of the year 1869, but its publication was delayed by the death of Professor Coffin, in 1873. The areas of high and low pressure with their seasonal changes were first made known to the world thru this great work of Buchan's, and no revision of that work was published or perhaps possible until he himself made it in his monograph of 1889, "On Atmospheric Circulation", published in Volume II of the physical and chemical series of the *Challenger Reports*.

During the last ten years of his life Doctor Buchan was an enthusiastic advocate of the establishment of mountain stations, especially the high-level station on the summit of Ben Nevis. This station was maintained with more or less completeness from December, 1883, to October, 1904, and a supplementary low station, at Fort William, from August, 1890, to October,

The highest and lowest water, mean stage, and monthly range at 293 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—H. C. Frankenfield, *Professor of Meteorology*.

1904. The complete record and discussion of these observations fills three volumes of the *Transactions of the Royal Society of Edinburgh*, which were compiled and edited by Doctor Buchan and Mr. Omond conjointly, forming a magnificent monument to one who served Science for her own sake—loving the work, and content with scant financial rewards.

An equally splendid monument to Buchan is the important chapter that he wrote in the compilation of *The Atlas of Meteorology*, published by Bartholomew in 1899. Doctor Buchan's work earned for him many recognitions in the shape of prizes and positions. During the last year of his life he received the well-deserved honor of election as a vice-president of the Royal Society of Edinburgh. For a considerable time he was a member of the Meteorological Council of the Royal Society at London. He was also inspector of stations for this council, and in that capacity traveled over the greater part of Scotland.

But it is not to his scientific worth alone that we must give testimony. He was a man of great simplicity of nature; he had a wide human sympathy and a singularly genial temperament. His wonderful memory and genial disposition placed his great store of knowledge at the service of others. He was also a valued elder in the St. George's Free Church. His wife died in 1900, but his only son, Dr. A. Hill Buchan, survives him.

We add the following extracts from a memorial article by W. N. Shaw, esq., as published in *Nature*, London, May 23, 1907:

A few words as to Buchan's scientific work must suffice. With Baxendell, of Manchester, he was largely instrumental in securing the general acceptance of Buys Ballot's principle of the relation of wind to air pressure. He had the faculty of statistical insight, and realized that by the appropriate combination of many observations it was possible to trace the interdependence of phenomena which might be affected separately by a number of independent causes. This insight is illustrated in a remarkable way by his papers with Sir Arthur Mitchell upon the relations of climate and health in London. Such a method of investigation does not always commend itself to the student of physics, who, fortunate in having the conditions under his own control, is accustomed to trace the direct connection between cause and effect in each separate experiment. But the remarkable results of Buchan's work, which still remains to be followed up, enable one to understand the enthusiasm for collecting observations, and more observations, that seem purposeless to some of those who look on.

His favorite method of meteorological investigation was the map. Beginning from the time when the reduction of the barometer to sea level for synchronous charts and the identification of closed isobars as cyclonic and anticyclonic areas were novelties, he was the first to trace the course of a "depression" across the Atlantic, and subsequently, by the collection and discussion of data from all parts of the world, to give, in a paper before the Royal Society of Edinburgh, "the mean pressure of the atmosphere and the prevailing winds over the globe".

This was followed by the monthly charts and tables representing the atmospheric circulation in the volume contributed to the *Challenger Reports* and published in 1889, and the corresponding results for "oceanic circulation" in 1895.

His monthly maps of forty-year averages for the British Isles developed likewise (with the assistance of Dr. A. J. Herbertson) into the compilation of the wonderful atlas of pictorial meteorology published by Bartholomew, in 1899. Therein is, indeed, a worthy representation of Buchan's meteorological method.

It was by the method of the map that he proposed to deal with the outstanding results of the Ben Nevis observations, which were collected largely under his own supervision, and have been already the subject of

numerous papers. His capacity for dealing in this way with huge masses of figures was amazing. I have often gone with him over the details of daily maps exhibiting the results for Scottish weather at official stations, lighthouses, and private stations to trace some generalization which had been suggested by his work. His program was to correlate these daily maps with the observations at the summit and base of the mountain. The methodical care in ordering the entries, and their arrangement as regards color or design, to bring out any salient features, were thoroughly characteristic of his work.

In thus taking leave of a kindly master and a valued friend, it is not too much to say that the work of Buchan's life has contributed largely to justify the claim of meteorology to be regarded as a separate scientific subject, entitled to separate academic recognition. The physics of the atmosphere has its geographical aspect, but it is not a branch of geography; it has its mathematical aspect, but it is not a branch of mathematics; it has its experimental aspect, but it is not a branch of experimental physics. The constitutional affection of the throat prevented Buchan from using his natural powers of exposition to their full extent, but may we not hope that the University of Edinburgh will see her way to recognize the devotion of her distinguished alumnus by providing the subject of his devotion with a voice among the sciences which she fosters?

RESOLUTIONS ADOPTED AT THE MILAN CONFERENCE FOR SCIENTIFIC AERONAUTICS.¹

Translated by Prof. A. LAWRENCE ROTCH.

The following resolutions were adopted by the commission:

1. For the official publication, the observations should be formulated according to the rules adopted and indicated in the report of the president. It is necessary that all the small inversions of temperature should be noted.

2. (a) The commission, on the proposition of Mr. Teisserenc de Bort, realizing the great importance of collecting sufficient observations to construct charts of the meteorological elements at various heights under different atmospheric conditions, believes that its efforts should be concentrated upon four groups of ascensions annually, called "grand international ascensions", to distinguish them from the monthly ascensions. These last are optional for stations that do not make aerial soundings their chief work.

(b) The quarterly ascensions will be made during three consecutive days, on dates to be fixed hereafter.

(c) It is recommended that the trajectories of the sounding balloons shall be determined by sighting, and that the same thing be done for pilot balloons, if no sounding balloons are launched, as will be the case at insular stations; in any case the drift of the clouds must be observed with great care. The new series will commence in March, 1907.²

3. It is also desirable, as Mr. Rykatchef suggested, to have at least one temporary station for these international observations in the midst of the great Asiatic anticyclone, especially in winter. If this station can be established, observations in winter should last seven days instead of three—that is to say, two days before and two days after the three normal days.

4. To examine the proposition of Mr. Köppen, the conference appoints a subcommittee composed of Messrs. Berson, Hergesell, Köppen, de Quervain, Rotch, and Teisserenc de Bort, which proposes—

(a) To adopt the proposition of Mr. Köppen to publish a compendium of the best methods employed for aerial soundings. This compendium will describe the methods and instruments categorically, in a form analogous to that of a dictionary, and the various institutions conducting aerial soundings will be consulted as regards the final version. The publication will be made with the funds of the international commission applicable to the publication of observations.

(b) The same subcommittee examined the question relating to the statistical table of ascensions. The form adopted by the Deutsche Seewarte is recommended for the kites, and the institutions are requested to give annually a similar résumé for the balloons.

5. The commission votes its thanks to Messrs. Teisserenc de Bort and Rotch for their splendid researches in the atmosphere above the Atlantic Ocean, and to the Imperial Minister of Marine for the participation of the German Marine in the exploration of the high atmosphere. It listens with interest to the communications of Messrs. Köppen and Hergesell relating to the results of the cruise of the ship *Planet*, which is to advance further the conquest of these unknown regions, and sends a congratulatory dispatch to the Prince of Monaco for the explorations accomplished by his yacht, the *Princesse Alice*.

6. The commission expresses its thanks to the Spanish Minister of War for allowing the military aeronauts to cooperate in the work of the commission, and particularly for the interesting researches made during the eclipse of the sun on August 30, 1905.

7. The commission recognizes with great pleasure the institution of aerial soundings by the Weather Bureau of the United States at Mount Weather, and hopes that these soundings will be extended to other stations of the service.

8. The conference agrees with Major Moedebeck that it would be useful, both for scientific ascensions and for aeronautics in general, if, on the topographic maps of the States, there should be indicated in red the luminous points which can serve for orientation at night, and also if all lines of dangerous electric wires as well as the places most sheltered from the wind should be marked on the maps.

9. The commission accepts Mr. Assmann's propositions with these slight modifications:

(a) The commission shall meet but once in three years unless there be especial reasons for assembling oftener.

(b) The meetings will be for the purpose of discussing the organization of the work, the methods and instruments, and scientific communications will be presented only at the end of the meetings if time permits.

10. The proposition of Mr. von Bassus is adopted to add to the form containing the reduction of the ascensions of sounding balloons, another column headed "Wind", and having subheadings for "Direction" and "Velocity". The lines of these columns and also those of the columns "Gradient" and "Ventilation" are to be doubled. The notes at the foot of the second page will indicate that up to 3000 meters the reduction should be made for each 500 meters, and above 3000 meters that it should be for each 1000 meters. All inversions, isothermal strata, and sudden changes of wind and humidity are to be noted.

11. It is desirable that the negotiations be continued, looking to the establishment of a seal of the International Commission for Scientific Aeronautics.³

GUILBERT'S RULES FOR WEATHER PREDICTION.

By OLIVER L. FASSIG, Research Director. Dated Mount Weather Observatory, Bluemont, Va., November 2, 1906.

In earlier numbers of the REVIEW (November, 1904, and January, 1905)¹ were published two letters relating to a proposed international competition at Liège, organized by the Belgian Astronomical Society, in order to bring out the present state of the art of predicting the weather. This competition was attended by several experts, some of whom have published their methods in full in accordance with the requirements of the jury of awards. The paper presented by M. Gabriel Guilbert, of Caen, was dated September 28, 1905, and attracted the most attention, as it contained a principle of forecasting that had not been employed or announced before.

The jury, composed of six well-known meteorologists, of whom Mr. A. L. Rotch, of Blue Hill Observatory, was the

¹ This would insure the instruments entering the different countries without examination by customs officers.—A. L. R.

² Vol. XXXII, page 523, and vol. XXXIII, page 11.

¹ See Monthly Weather Review, April, 1907, vol. XXXV, p. 181.

² Subsequently postponed until July.—A. L. R.